

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the claim amendments and following remarks. Claims 1-55 are pending in the present application of which claims 1, 23, 31, 36, and 47 are independent. Claim 31 has been amended. Claims 36-46 are allowed.

Claims 31-35 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claims 1-12, 23-26, 31-35 and 47-55 stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Caplet (U.S. Patent Publication No. 2003/0166310 A1) ("Caplet"). Claims 13-22 and 27-30 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The rejections are respectfully traversed for at least the following reasons.

Drawings

The Applicants respectfully request that the Examiner indicate whether the formal drawings submitted with the originally filed application are acceptable.

Claim Rejection under 35 U.S.C. 112, second paragraph

Claims 31-35 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. On page 2 of the Office Action, the Examiner states that "a portion of a second wafer located between a first wafer and a second wafer," as recited in claim 31, is not understood. Claim 31 has been amended to recite "a portion of a

second wafer located between a first wafer and a *third* wafer.” The Applicants therefore respectfully request withdrawal of the rejection.

Claim Rejection under 35 U.S.C. 102

The test for determining if a reference anticipates a claim, for purposes of a rejection under 35 U.S.C. § 102, is whether the reference discloses all the elements of the claimed combination, or the mechanical equivalents thereof functioning in substantially the same way to produce substantially the same results. As noted by the Court of Appeals for the Federal Circuit in *Lindemann Maschinenfabrick GmbH v. American Hoist and Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984), in evaluating the sufficiency of an anticipation rejection under 35 U.S.C. § 102, the Court stated:

Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.

Therefore, if the cited reference does not disclose each and every element of the claimed invention, then the cited reference fails to anticipate the claimed invention and, thus, the claimed invention is distinguishable over the cited reference.

The Office Action sets forth a rejection of claims 1-12, 23-26, 31-35 and 47-55 under 35 USC 102(e) as being allegedly anticipated by U.S. Patent Publication No. 2003/0166310 A1 to Caplet (“Caplet”). This rejection is respectfully traversed.

Claim 1 recites a microelectromechanical system (MEMS) device, comprising “a first wafer,” “a second wafer,” “a third wafer, wherein at least a portion of the second wafer is movably connected between the first wafer and the third wafer” and “material bonding the first wafer, the second wafer, and the third wafer together.”

Claim 23 recites a MEMS device comprising “a chip including three wafers connected together in a stacked arrangement,” the stacked arrangement comprising “a first wafer of the three wafers,” “a second wafer of the three wafers connected below the first wafer in the stacked arrangement, the second wafer including a movable portion” and “a third wafer of the three wafers connected below the second wafer in the stacked arrangement, wherein the three wafers are connected using a bonding material” and “at least one via in the second wafer operable to pass electrical signals through the second wafer.”

Claim 31 recites a three-wafer MEMS chip comprising “mechanical means for moving in response to one of an external force and a force generated internal to the chip, the mechanical means being a portion of a second wafer located between a first wafer and a third wafer,” “bonding means for bonding the first wafer, the second wafer and the third wafer to form a single chip” and “via means for conducting electrical signals through the second wafer.”

Claim 47 recites a MEMS transducer device comprising “a first wafer,” “a second wafer,” “a third wafer, wherein at least a portion of the second wafer is movably connected between the first wafer and the third wafer,” “material bonding the first wafer, the second wafer, and the third wafer” and “at least one circuit operable to detect movement of the at least a portion of the second wafer.”

Caplet fails to teach “material bonding the first wafer, the second wafer, and the third wafer together,” as recited in claim 1. Caplet also fails to teach a MEMS device wherein “the three wafers are connected using a bonding material,” as recited in claim 23. Caplet also fails to teach a three-wafer MEMS chip comprising “bonding means for bonding the first wafer, the second wafer and the third wafer to form a single chip,” as recited in claim 31.

Furthermore, Caplet fails to teach a MEMS transducer device comprising “material bonding the first wafer, the second wafer, and the third wafer,” as recited in claim 47.

Specifically, Caplet teaches a mechanical microstructure including a deformable first layer overhanging a second layer and including a cavity set back from an external face of the deformable first layer (Abstract). The microstructure taught by Caplet includes top layer (30), central layer (20) and support layer (10). However, Caplet fails to teach a material bonding the top layer (30), central layer (20) and support layer (10) to form a single chip. The Examiner cites paragraphs [0033], [0053] and [0054] and states that Caplet discloses a microelectromechanical system device comprising a first wafer (10), a second wafer (20) having a movable portion (24), a third wafer (30), and “material bonding the first wafer, the second wafer, and the third wafer together (12).” It appears the rejection is alleging that oxide layer 12 disclosed by Caplet is the material bonding the first wafer (10), the second wafer (20), and the third wafer (30) together.

The rejection is unsupported by the disclosure of Caplet. Specifically, Caplet discloses and describes layer 12 as “a discontinuous oxide layer 12 which is applied to the portions of the face of the support layer 10 intended to be attached to the central layer 20” (paragraph [0041]). Caplet also discloses that “oxide layer 12 provides insulation between the central layer and the support layer 10” (paragraph [0044]). Caplet, however, fails to teach that the oxide layer 12 is a bonding layer used to bond three wafers together to form a single-chip MEMS device. Nowhere does Caplet disclose that the oxide layer 12, has bonding properties. Thus, Caplet fails to teach a three wafer MEMS device wherein the three wafers are bonded together using a bonding material.

Claim 5 incorporates all the limitations of claim 1, and is allowable for all the reasons that claim 1 is allowable, and by virtue of its dependency. In addition, Caplet fails to teach “a dielectric in the internal cavity, wherein the seal seals the dielectric in the internal cavity,” as recited in claim 5. With regard to claim 5, the Examiner states that Caplet shows a dielectric (18) in an internal cavity. Caplet teaches a cavity 15, and a layer 18 formed as an “undercut 18 in the oxide layer 12.” (Figure 1; paragraph [0059]). The layer 18, however, is not formed *in* the cavity 15; instead, layer 18 is formed between layer 10 and layer 20 (e.g., Figure 1). Thus, Caplet fails to teach a dielectric that is in the cavity 15. Furthermore, Caplet fails to teach a seal that “seals the dielectric in the internal cavity,” as recited in claim 5. Caplet fails to teach any material that operates to seal a dielectric in an internal cavity. For example, the layer 12 is an oxide layer between layers 10 and 20; however, Caplet fails to teach that layer 12 operates to seal a dielectric in an internal cavity. Caplet also fails to teach a seal formed from a material bonding a first wafer, a second wafer, and a third wafer together, wherein the seal seals the internal cavity. For at least the above reasons, Caplet fails to anticipate claim 5 and withdrawal of the rejection is respectfully requested.

Claim 9 incorporates all the limitations of claim 1, and is allowable for all the reasons that claim 1 is allowable, and by virtue of its dependency. In addition, Caplet fails to teach a MEMS device comprising “at least one via in the second wafer, the at least one via providing a path for electrical signals traveling through the second wafer,” as recited in claim 9. With regard to claim 9, the Examiner states that Caplet “shows the path (52) for electrical signals traveling through the second wafer. Caplet teaches the connecting wires 51 and 52, one of which is connected to the support layer 10 and the other fixed at a bottom of a well 17 (Figure 1). However, Caplet fails to teach that connecting wire 52 provides at least one via in

the second wafer. Neither the support layer 10 or the well 17 constitute at least one via in a second wafer providing a path for electrical signals through a second wafer. Instead, a contact is used on an exterior surface of the support layer 10 and at the bottom of the well 17. (Figure 1; paragraph [0056]) Thus, Caplet fails to teach a path through a second wafer. Hence, Caplet fails to teach all the limitations as recited in claim 9. For at least the above reasons, Caplet fails to anticipate claim 9 and withdrawal of the rejection is respectfully requested.

Claim 11 incorporates all the limitations of claim 1, and is allowable for all the reasons that claim 1 is allowable, and by virtue of its dependency. Furthermore, Caplet fails to teach a MEMS device “wherein a thickness of the second wafer is approximately equal to 300 microns or less,” as recited in claim 11. With regard to claim 11, the Examiner states that paragraph [0036] of Caplet shows that the wafer can be 300 microns thick. However, the rejection is unsupported by the disclosure of Caplet. Specifically, Caplet discloses and describes in paragraph [0036] that “the top layer 30 corresponding to the top portion is 300 μm thick.” It appears that the Examiner is alleging that the top layer 30 taught by Caplet anticipates “the second wafer” recited in claim 11. However, the second wafer of the Applicants’ invention is clearly the wafer wherein “at least a portion of *the second wafer* is movably connected between the first wafer and the third wafer.” Since the top layer 30 taught by Caplet is not between layer 10 and layer 20 (Figure 1), the top layer 30 taught by Caplet cannot correspond to “the second wafer” recited in claim 11. Thus, Caplet fails to teach all the limitations as recited in claim 11. For at least the above reasons, Caplet fails to anticipate claim 11 and withdrawal of the rejection is respectfully requested.

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Caplet also fails to teach a MEMS transducer as recited in claim 52, wherein “the at least one circuit” comprises “components on at least one of the first wafer and the third wafer and also including components on the second wafer,” and “wherein at least one of the components on the first wafer or the third wafer and at least one of the components on the second wafer are in electrical communication with each other by transmitting the electrical signals using the at least one via.” With regard to claim 52, the Examiner states that the electrical signals in Caplet are transmitted using at least one via (17).” Caplet teaches a well 17 (Paragraph [0046]). However, Caplet fails to teach all the limitations of claim 47, for at least the above reasons. Specifically, Caplet fails to teach a MEMS transducer device comprising “material bonding the first wafer, the second wafer, and the third wafer,” as recited in claim 47. Since claim 52 incorporates all the limitations of claim 47, Caplet also fails to teach all the limitations of claim 52 for at least the same reasons, and by virtue of its dependency. For at least the above reasons, Caplet fails to anticipate claim 52 and withdrawal of the rejection is respectfully requested.

Claims 2-12 incorporate all the limitations of claim 1, claims 24-26 incorporate all the limitations of claim 23, claims 32-35 incorporate all the limitations of claim 31, and claims 48-55 incorporate all the limitations of claim 47. Caplet fails to teach the invention claimed in claims 2-12, 24-26, 32-35 and 48-55 for at least the reasons given above for the respective independent claims 1, 23, 31 and 47. Claims 1-12, 23-26, 31-35 and 47-55 are thus allowable over Caplet, and withdrawal of the rejection is respectfully requested.

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Conclusion

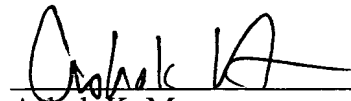
In light of the foregoing, withdrawal of the rejections of record and allowance of this application are earnestly solicited. Should the Examiner believe that a telephone conference with the undersigned would assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below. Please grant any required extensions of time and charge any fees due in connection with this request to deposit account no. 08-2025.

Respectfully submitted,

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